

REMARKS

By this amendment, applicants have amended claim 1 to indicate that the apparatus for electroless spray deposition includes a source of electroless plating solution and that the sprayer is connected to the source of electroless plating solution. See, e.g., Figures 1 and 2 and the paragraph bridging page 7 and 8 of applicants' specification. Applicants have also added claims 28 and 29 to define further aspects of the present invention. See, e.g., page 6, lines 19 - 22 of applicants' specification.

Claims 1, 4 and 10 - 12 stand rejected under 35 USC 102(e) as allegedly being anticipated by United States Patent No. 6,248,168 to Takeshita et al. Applicants traverse this rejection and request reconsideration thereof.

The rejected claims relate to an apparatus for electroless spray deposition of a metal layer on a substrate. The apparatus of the present invention includes a processing chamber to hold at least one substrate on which the metal layer is to be deposited, a source of electroless plating solution, a sprayer provided within the processing chamber and connected to the source of electroless plating solution to spray the electroless plating solution onto the at least one substrate, and a drain provided in the processing chamber to drain the electroless plating solution from the processing chamber. The processing chamber of the apparatus of the present invention includes at least one section movable between an open position to allow the at least one substrate to be introduced into and removed from the processing chamber, and a closed position to seal the processing chamber to allow for pressurization of the processing chamber. An inlet to provide pressurizing gas to the processing chamber and an exhaust line to exhaust pressurizing gas from the processing chamber are also provided. The apparatus of the present invention

includes a pressure regulator to regulate pressure within the processing chamber. These features are neither disclosed nor suggested by Takeshita et al.

The Takeshita et al patent discloses a spin coating apparatus including an agent unit and a solvent replacement unit. The Examiner refers to Figure 26 of this patent which is a side view of a profile of the coating unit. The coating unit 2 includes a movable cover 342 which can open or close opening 341 through which the wafer W can be passed. A coating liquid nozzle 361 is provided for dispensing the coating liquid X approximately on the rotation center of the surface of a wafer and a coating liquid nozzle 362 is provided for dispensing the solution S approximately on the rotation center of the surface of the wafer. The coating unit 2 includes a solvent vapor dispensing pipe 351, a drain pipe 353 and an exhaust pipe 354. However, the spin coating unit of Takeshita et al does not include (and the Takeshita et al patent would not have suggested) a source of electroless plating solution. Accordingly, the Takeshita et al patent does not disclose the presently claimed invention.

Claims 5 and 9 stand rejected under 35 USC 103(a) as allegedly being unpatentable over Takeshita et al in view of United States Patent No. 6,248,398 to Talieh et al. Applicants traverse this rejection and request reconsideration thereof.

The Examiner has cited the patent to Talieh et al for its teachings in connection with the use of a O-ring seal for a processing chamber. However, even assuming, arguendo, one of ordinary skill in the art would have combined the teachings of Takeshita et al and Talieh et al, it is submitted the combined teachings would not have suggested the presently claimed invention, i.e., an apparatus for electroless spray deposition including a source of electroless plating solution.

Accordingly, claims 5 and 9 are patentable over the proposed combination of patents at least for the reasons noted above.

Claim 6 stands rejected under 35 USC 103(e) as being unpatentable over Takeshita et al in view of United States Patent No. 6,451,114 to Stevens. Applicants traverse this rejection and request reconsideration thereof.

The Examiner has cited the Stevens patent as allegedly teaching an elongated sprayer head. However, even assuming, arguendo, the Stevens patent to teach an elongated sprayer head, it is submitted there is no suggestion in Stevens or in Takeshita et al to include an elongated sprayer head in the apparatus of Takeshita et al. Moreover, even assuming, arguendo, one of ordinary skill in the art would have included an elongated sprayer head in the spin coating apparatus of Takeshita et al, even the combined teachings of Takeshita et al and Stevens et al would not have suggested the presently claimed invention, i.e., an apparatus for electroless spray deposition including a source of electroless plating solution.

Claims 1, 4, 6 - 109 and 13 - 15 stand rejected under 35 USC 103(e) as being unpatentable over United States Patent No. 6,065,424 to Shacham-Diamond et al in view of Takeshita et al. Applicants traverse this rejection and request reconsideration thereof.

The Shacham-Diamond et al '424 patent discloses an apparatus for electroless deposition of metal films with a spray processor. The Examiner refers to Figure 2 of this document (and apparently also to Figure 1) which show a process chamber 40, a line 48 to supply nitrogen gas to the chamber, a valve 50 to regulate the pressure of the gas supplied to the chamber, a spray post 58 and a waste line 52 including a valve 54. While the Examiner refers to element 34 as an exhaust line, element 34 is actually a plating solution supply line. In the embodiment shown in

Figures 1 and 2 of Shacham-Diamond '424, the nitrogen supplied through line 48 is used to atomize the liquid solution, creating small droplets with liquid high kinetic energy. While it is disclosed that, during nitrogen atomization, the chamber may be quickly filled with N₂ (column 8, lines 44 - 46), this patent does not disclose, in addition to a drain for draining electroless plating solution, an exhaust line to exhaust pressurized gas from the processing chamber and a pressure regulator to regulate pressure within the processing chamber. As recognized by the Examiner, the Shacham-Diamond '424 patent also does not disclose or suggest a cover movable between an open and closed position, the closed position sealing the processing chamber for pressurization. While the Examiner relies on the Takeshita et al patent as allegedly teaching this latter feature, it is submitted the Takeshita et al patent is directed to a spin coating apparatus quite different than the electroless deposition apparatus of Shacham-Diamond et al '424. Accordingly, it is submitted there would have been no motivation to combine the disparate teachings of these patents. Therefore, the presently claimed invention is patentable over Shacham-Diamond '424 and Takeshita et al.

Claim 5 stands rejected under 35 USC 103 as being unpatentable over Shacham-Diamond '424 and Takeshita et al and further in view of Talieh et al. The Examiner has cited the Talieh et al patent for its teachings in connection with the use of an O-ring to seal a processing chamber. However, it is submitted the Talieh et al patent does not remedy any of the basic deficiencies noted above with respect to Shacham-Diamond et al '424 and Takeshita et al. Accordingly, claim 5 is patentable for at least the reasons noted above.

Claims 1 - 3 and 6 - 15 stand rejected under 35 USC 103(a) as being unpatentable over Shacham-Diamond et al '424 in view of Talieh et al. This rejection is also traversed.

The deficiencies of Shacham-Diamond et al are noted above. As noted above, element 34 of Shacham-Diamond is not an exhaust line, as alleged by the Examiner, but an electroless plating solution supply line. Accordingly, even assuming, arguendo, one of ordinary skill in the art to have combined the teachings of Shacham-Diamond and Talieh et al, it is submitted the combined teachings would not have suggested the presently claimed invention, i.e., an apparatus for electroless spray deposition including an inlet to provide pressurizing gas to the processing chamber, an exhaust line to exhaust pressurizing gas from the processing chamber, a pressure regulator to regulate pressure within the processing chamber, a source of electroless plating solution and a drain provided in the processing chamber to drain the electroless plating solution. Therefore, the claims are patentable over the proposed combination of Shacham-Diamond et al '424 and Talieh et al.

Applicants note the Examiner has cited a number of additional documents as being pertinent to applicants' disclosure. However, since these documents were not applied in rejecting claims formerly in the application, further discussion of these documents is deemed unnecessary.

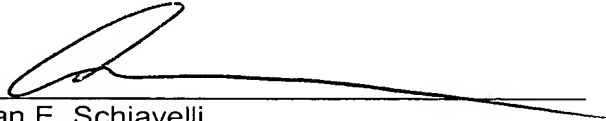
In view of the foregoing amendments and remarks, favorable reconsideration and allowance of all of the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli,

Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 219.40227X00),
and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

A handwritten signature in black ink, appearing to read 'Alan E. Schiavelli', is written over a horizontal line.

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VERSION WITH MARKINGS TO SHOW CHANGES

1. (Amended) An apparatus for electroless spray deposition of a metal layer on a substrate, comprising:

a processing chamber to hold at least one substrate on which the metal layer is to be deposited, the processing chamber including at least one section movable between an open position to allow the at least one substrate to be introduced into and removed from the processing chamber and a closed position to seal the processing chamber to allow for pressurization of the processing chamber;

an inlet to provide pressurizing gas to the processing chamber;

an exhaust line to exhaust pressurizing gas from the processing chamber;

a pressure regulator to regulate pressure within the processing chamber;

a source of electroless plating solution;

a sprayer provided within the processing chamber and connected to the source of electroless plating solution to spray ~~an~~ the electroless plating solution onto the at least one substrate; and

a drain provided in the processing chamber to drain the electroless plating solution from the processing chamber.